

Claims

What is claimed is:

1. A method, comprising:
 - a) converting a first flow of data words into a second flow of data words, said first flow of data words having a first data rate, said second flow of data words having a second data rate, said second data rate greater than said first data rate such that said second flow of data words under-runs; and
 - b) transmitting said second flow of data words over a plurality of communication links, a data alignment data structure transmitted over each of said communication links for each said under-run.
2. The method of claim 1 wherein said converting further comprises expanding said first flow of data words into said second flow of data words by combining a first data word of said first flow of data words with at least a portion of a second data word of said first flow of data words such that said second flow of data words is wider than said first flow of data words.
3. The method of claim 1 further comprising encoding data within either said first flow of data words or said second flow data words, said encoding for reliable transmission over said plurality of communication links.

4. The method of claim 3 wherein said encoding further comprises 8B/10B encoding.
5. The method of claim 4 wherein said data alignment data structure is a K28.5 character.
6. The method of claim 1 wherein each of said plurality of communication links corresponds to an LVDS communication link.
7. The method of claim 1 further comprising receiving a stream of data from each of said plurality of communication links.
8. The method of claim 7 further comprising obtaining data alignment on each of said streams of data by identifying an appearance of a said data alignment data structure within each of said streams of data.
9. The method of claim 7 further comprising obtaining lane alignment to remove skew as between each of said streams of data by aligning said streams of data, with respect to each another, according to their data alignment data structure arrival time, said aligning causing a formation of a third flow of data words that corresponds to a reproduction of said second flow of data words.

10. The method of claim 9 wherein said third flow of data words is an encoded form of said second flow of data words.

11. The method of claim 9 further comprising reversing said converting in order to reproduce said first flow of data words from said third flow of data words.

12. The method of claim 11 further comprising removing any said data alignment data structures found within said third flow of data words during said reversing.

13. The method of claim 11 further comprising decoding said third flow of data words during said reversing.

14. An apparatus, comprising:

a transmitter that expands a flow of input data words into a second flow of data words, said flow of input data words having a first data rate, said second flow of data words having a second data rate, said second data rate greater than said first data rate such that said second flow of data words under-runs, said transmitter having a plurality of communication links that each transmit:

- 1) a different piece of said second flow of data words; and
- 2) a data alignment data structure for each said under-run.

15. The apparatus of claim 14 further comprising an encoder that encodes data within either said first flow of data words or said second flow data words, said encoding for reliable transmission over said plurality of communication links.
16. The apparatus of claim 15 wherein said encoder further comprises an 8B/10B encoder.
17. The apparatus of claim 16 wherein said data alignment data structure is a K28.5 character.
18. The apparatus of claim 14 wherein each of said plurality of communication links corresponds to an LVDS communication link.
19. The apparatus of claim 14 further comprising a receiver that receives a stream of data from each of said plurality of communication links.
20. The apparatus of claim 19 wherein said receiver further comprises, for each of said communication links, a data alignment unit that obtains data alignment on each of said streams of data by identifying an appearance of a said data alignment data structure within each of said streams of data.
21. The apparatus of claim 19 wherein said receiver further comprises a lane alignment unit that removes skew as between each of said streams of data by

aligning said streams of data, with respect to each another, according to their data alignment data structure arrival time, said aligning causing a formation of a third flow of data words that corresponds to a reproduction of said second flow of data words.

22. The apparatus of claim 21 wherein said third flow of data words is an encoded form of said second flow of data words.

23. The apparatus of claim 21 wherein said receiver further comprises a word alignment data unit that reproduces said first flow of data words from said third flow of data words by reversing said converting.

24. The apparatus of claim 23 wherein said word alignment data unit, during said reversing, removes any said data alignment data structures found within said third flow of data words.

25. The apparatus of claim 24 wherein said word alignment data unit further comprises a decoder that decodes said third flow of data words during said reversing.

26. An apparatus, comprising:

- a) a word width expansion unit that expands a flow of input of data words into a second flow of data words, said flow of input data words having

- a first width and a first data rate, said second flow of data words having a second width, said second width greater than said first width;
- b) a queue that receives said second flow of data words and services said second flow of data words from said queue according to a second data rate, said second data rate greater than said first data rate such that said queue under-runs;
- c) a plurality of transmission links that transmit different pieces of said serviced second flow of data words and transmit a data alignment data structure for each of said queue under-runs.

27. A method, comprising:

- a) receiving a first and second data word according to a first data rate;
- b) entering a third data word into a queue, said third data word a combination of said first data word and at least a portion of said second data word;
- c) servicing said third data word from said queue according to a second data rate, said second data rate higher than said first data rate such that said queue under runs;
- d) fanning out said third data word into a plurality of pieces;
- e) transmitting each of said pieces over a different communication link;
- and
- f) transmitting a data alignment data structure over each of said communication links whenever said queue under runs.